Wild Card as a Phenomenon Cushioning Uncertain Events – Example of Industry 4.0

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The aim of the article is the analysis and characterization of wild cards in both theoretical and practical perspective – in the context of the Industry 4.0. Wild cards are potential future events with a relatively low-probability but high impact on the activity (life, bussines, etc.). Despite the high degree of complexity of the process of identifying, analyzing and interpreting this type of phenomena it seems to be indispensable to have a basic and practical knowledge for the analysis of wild cards. This knowledge can be very useful, especially in an environment exposed to exceptional or emergency event. This seems to be particularly important in the future context in the case of new events, burdened with a high degree of uncertainty. Industry 4.0 is a such event, as one of the main areas of the fourth industrial revolution.

Keywords: uncertainty, wild cards, Industry 4.0, weak signals.

1. INTRODUCTION

Modern researchers of future have gone on planning of optimism, characteristic for studies in the eighties of the twentieth century. It was noted that there may be always a revolutionary phenomenon changing the whole picture of the future, thinking about it, the concepts as well as goals associated with it. Events such as: the first oil crisis in the 70', the attacks on 11th September 2001, the collapse of the communist bloc are examples of surprising phenomena. In the literature such events are called wild cards (Steinmüller, 2004, p. 193).

In general, it should be stated that the wild cards are future events from today's point of view difficult to anticipate, surprisingly, with a low probability of joining, sudden, hard to prepare for it, having a significant impact (negative or positive) for specified audiences (Hiltunen, 2013, p. 41).

Wild cards change the human point of reference, a mental map of the world. In addition, they change the reality, but also, and perhaps above all, change the perception of reality and operating concepts. They change the picture of the future, but often also affect a completely different interpretation of past events (Steinmüller, 2004, p. 196).

The previous analysis on the occurrence of unexpected events leads to the conclusion that the future is mostly poorly defined. Wild cards are specific labels of events that interrupt the evolution of the implementation of strategic plans (Mendonca, Cunha, Ruff & Kaivo-oja, 2009, p. 34).

Despite the high degree of complexity it seems indispensable to have a basic and practical knowledge for the analysis of phenomena such wild card, which can be useful, especially in an environment exposed to exceptional or emergency event (Mendonca, Cunha, Kaivo-oja & Ruff, 2004, p. 202). This seems to be especially important in the case of new events, burdened with a high degree of uncertainty. Industry 4.0 is a such event, as one of the main areas of the fourth industrial revolution.

With the development of any complex phenomenon, to which include Industry 4.0, you can never say that the phenomenon will continue to grow without interference of turbulence. The idea of a fourth industrial revolution should be considered in the category of complex systems. With the principle of indeterminacy each complex

system, can never be understood fully what the result that would be burdened with a high degree of uncertainty (Cempel, 2002).

2. CRITICAL CHARACTERISTICS OF WILD CARDS

Wild cards are single (specific, historically original) sudden (abrupt, fast), surprising (unexpected, surprising, intriguing) and devastating (severe, serious) events. Using the concept of wild cards, events can be described as: 1) discrete, unique; 2) that arise quickly; 3) not fully recognized *ex ante* on the present and past basis; 4) leading to profound disturbances and changes in the known state of things, not only in terms of quantity, affecting the absolute level of the existing trend, but also transforming the qualitative characteristics of the phenomenon, perhaps setting new directions for future development; 5) leading to a revision of views on the established order, and 6), resulting in a very difficult assessment of the system under test based on new dimensions (variables). Wild cards can be natural or caused by humans and can be a source of positive or negative consequences for the concerned parties. Wild cards can also arise endogenously, under the influence of the unexpected conjunction of factors occurring, for example in industry or company (Mendonca, Cunha, Ruff & Kaivo-oja, 2009, p. 25).

Wild cards affecting the paradigm of thinking can cause the following reactions: 1) "stretch"; 2) "expand"; 3) "crack". In the first case, occour the extension of thinking beyond the current paradigm, seeking to allow the consideration of alternative points of view. In the second case occurs wider acceptance of alternative views, an increasing number of factors regarding the examined issues, changing the time frame. The third function is the total change (breakdown) the existing paradigm, which affects the process of finding a completely new approach (Barber, 2006, p. 80).

The effects of wild cards do not have to be sudden and can be spread over time. An example is climate change, caused by emissions of carbon dioxide. It is a wild card that can occur over time, but with irreversible consequences (Mendonca, Cunha, Kaivo-oja & Ruff, 2004, p. 203).

According to J. L. Petersen in the process of strategic planning of economic organization can ask three questions in relation to the wild cards:

1. What are the major wild card for the organization?
2. Is it possible to predict their arrival?
3. Is there anything you can do with them?

If managers can answer these three questions, the analysis of wild cards have a higher probability that either the impact of some of the negative main future events can be averted or moderated, or positive action will materialize (Mendonca, Cunha, Kaivo-oja & Ruff, 2004, p. 204).

Sometimes mistakenly, wild cards and trends are treated as synonyms. They should be treated separately (Saritas & Smith, 2011, p. 296). A few comparative examples relating to selected aspects of human life is presented in Table 1.

Table 1. Comparison of trends and wild cards in relation to certain aspects; source: Saritas & Smith, 2011, p. 296.

Aspect	Trends	Wild Cards
Globalizatin	The development of globalization of financial markets, goods and services, labor	• Crash in the global financial market • Globalization "without a human face"
Demographics	The aging population and declining population of the western world	• The new "baby boom" in the West • New conflict of generations
European Union	Expansion and development	• Orientation of Europe to the East • Leaving the EU by other countries
Lifestyle	Collapse of traditional values, family breakdown	• Return to the traditional way of life • Spiritual Revolution
Technology	Development of BIO INFO NANO COGNO	• The end of Moore's Law • The length of human life exceeding 100 years
Environment	Global warming	• Exhaustion of natural resources • Cold fusion – a common phenomenon in the energy sector

Not all wild cards are unimaginable. Information on the likely, direct and indirect effects for example may be made by analyzing weak signals (Mendonca, Cunha, Kaivo-oja & Ruff, 2004, p. 204). Weak signals are early, vague signs of impending major events, changes that will affect, in a strictly indefinite future, on the trajectory of development of the system. Weak signals are referred as something new, surprising, uncertain, irrational, unreliable, difficult to track, far distant in time from the time in which the events, ideas will be matured and dominant (Magruk, 2010, p. 130).

3. ANALYSIS OF POTENTIAL WILD CARDS FOR INDUSTRY 4.0

The industry is running out of easy methods to ensure the effectiveness of the enterprise functioning. Industrial production in countries such as Germany, China, USA, is increasingly driven by the development of new technologies, including cyber-physical systems, big data, cloud computing, Internet of Things. This phenomenon has gained the name of the Industry 4.0 (Turczyński, 2016).

According to the 2016 Global Manufacturing Competitiveness Index (conducted among over 500 CEOs and experienced leaders of worldwide manufacturing companies) was idetyfied future importance of advanced manufacturing technologies: predictive analytics, smart, connected products (Internet of Things – IoT), advanced materials, smart factories, digital design, simulation, and integration, high performance computing, advanced robotics, additive manufacturing (3D printing), open-source design/direct customer input, augmented reality (to improve quality, training, expert knowledge), augmented reality (to increase customer service & experience) (Giffi, Rodriguez, Gangula, Roth & Roth, 2016, p. 7).

Each of these technologies will be used in smart foctories in the Industry 4.0, in different phases and ranges. These phenomena are so new and so complex that they require in-depth prospective analysis. One can clearly identify and analyze potential wild card.

In the analysis of wild card is very important research context. In this article, geographical context is Europe, with particular consideration of Germany. Germany is a country where the idea of Industry 4.0 was born, as well as grow the hardest among European countries.

Reasons why you should deal with the identification of unexpected events in the area of Industry 4.0 can be divided into two groups: I) general factors/weaknesses and II) threats.

General factors include:

1. The relative novelty of the idea of Industry 4.0 – its concept was born in 2011 (MacDougall, 2014, p. 14);
2. The high complexity of all occurring processes. Their proper understanding requires additional tools and procedures to support people (Thimsen, 2014);
3. Many manufacturing systems are not ready to manage big data due to the lack of smart analytic tools (Lee, Kao Yang, 2014, p. 3);
4. The problem with the management of Big Data in the following areas: volume – the amount of data; variety of data; velocity – the speed of arrival of new data and their analysis; veracity – reliability (Mauro Greco & Grimaldi, 2015, p. 103);
5. For existing factors implementation the concept of "Industry 4.0" is currently very difficult or even impossible (Kopp, 2014, p. 76);
6. The high effectiveness cost of implementation or adaptation of existing infrastructure to the concept of Industry 4.0.

Potential threats are as follows:

1. Communication between all components of Industry 4.0 will go beyond the secure internal network, and the device will often be mobile (buttermilk, 2014);
2. Delaying small and medium-sized enterprises for modern solutions of global world (Thimsen, 2014);
3. In created new system, involving a lot of stakeholders may occour loss know-how of individual companies (Wübbeke, Conrad, 2015, p. 1);
4. Excessive growth can reduce the possibility of less skilled workers, which can turn into social discontent and rebellion (Blasco, Eiermann & Vornholt, 2015, p. 29);
5. Greater potential for hacking attacks than in traditional industry (Wang, Wan & Zhang, 2016, p. 8);
6. Leaving the European Union by country which implement the concepts of Industry 4.0 – a real threat after the last vote on brexit and

signals about leaving the European Union by France or the Czech Republic.

Helpful in the identification of the wild card is their combination with other research methods. Expect the most common connection, with the "weak signals", interesting, broad spectrum facilitates the use STEEPVL method. The results of that analysis are presented in Table 2. Inspiration of this research was the selected works of students of management faculty at Bialystok University of Technology, as the part of the course "foresight in strategic fmanagement".

A. Kononiuk and A. Magruk advocating the use in research of wild cards elements such as literature review, desk research, weak signals and STEEPVL dimensions (Kononiuk & Magruk, 2015, p. 954). Factors STEEPVL reflect the following aspects: Social, Technological, Economic, Ecological, Political, Values as well as Legal (Nazarko & Kędzior). The use of the literature helps to identify weak signals, which in the context of the forward-looking authenticate appearance of a wild card.

Table 2. Potential wild cards in the field of Industry 4.0, source: own work.

STEEPVL	Potential wild card	Causes/ Weak Signals	Potential influence ✸ Credibility ♦ Horizon
S	The creation of a global university with a educating on Industry 4.0 using virtual and neural ways of teaching	• Polish Virtual University offering its students a virtual courses of study (www.puw.pl) • Develop neurobiological foundations of learning (Żylińska, 2013)	✸✸ ♦ 2030
T	3D and 4D printers, including food printing available for mass client	• Available on market 3D printer – ChocCreator printing chocolate items (swiatdruku3d.pl) • Starting in the Netherlands in 2016, the first in the world restaurant with food printed in 3D technique (3dprintingindustry.com)	✸✸✸ ♦♦ 2030
E	Cessation of work on the development of the concept of Industry 4.0	• The EU is close to the lost decade, ad. integration crisis, recession and deflation (Szewczak, 2014) • The unfavorable international situation, influencing the negative phenomena export-import	✸✸✸ ♦ 2050
E	Antimatter – the main source to generate electricity	• Experiments on gaining antimatter at CERN (home.com) • Research into the energy from antimatter (futurism.com)	✸ ♦ 2100
P-L	The total omission of man in the production process	• In Dongguan (China), in 2015 was launched the first large factory (modules for mobile phones), in which production work only robots (Kaczmarczyk, 2015). • Studies of the University of Oxford suggests that within 10-20 years, a new generation of advanced robots will replace completely human in about 700 profession (Moll, 2014).	✸✸ ♦ 2035
V	People en masse choose to operate in virtual reality, in many areas, eg. in dreams, tourism, partnetship, education, etc.	• Development of augmented reality (Glockner, Jannek, Mahn & Theis, 2014) • One of the main megatrend – digitization & e-Substitution (Bubner, Bubner, Helbig & M Jeske, 2014, p. 5)	✸✸ ♦ 2040

The above analysis is the result of the compilation of selected elements of methodologies to identify and analyze wild cards shown in studies: 1) according to K. Steinmüller the analysis of the wild cards must be taken into account aspects such as theme, influence, credibility, scale, time and reason (Steinmüller 2004 , p. 197); 2)

4. CONCLUSIONS

Changes in the business environment forces organizations and companies to continuously adapt to changing realities, new concepts, technology products. Identifying future trends and prediction of changes in a dynamic environment have become

a benchmark for the competitiveness of organizations. In addition, the ability of companies to cope with uncertainty and rapid adaptation to a significant, and sometimes sudden change has become a key factor of success, becoming the big challenge for managers (Varum & Melo 2010, p. 355; Halicka 2016, pp. 574-575).

The aim of "Industry 4.0" is to create intelligent enterprises, characterized by adaptability, efficiency of resource use, ergonomics, the ability to optimize complex logistics processes (for example to Cloud Supply Chains) (Grzybowska, Kovács & Lénárt, 2014, p. 42) and integration with customers and partners in business processes (ITM Poland 2016). This requires establishing the factory with capabilities of selfawareness, selfprediction, selfcomparison, selfreconfiguration, and selfmaintenance (Lee, Kao, & Yang, 2014, p. 4).

Despite the high programmability of Industry 4.0, skipping the possibility of appearance of unforeseen events seems be a big mistake, both in external and internal, both positive and negative sphere.

In the author's opinion, due to the large turbulent environment, requirements connected with dynamics of economic environment, time pressure, resource limitations and rapid growth in the problem of complexity, growing number of new ideas for management (Stasiuk-Piekarska, Wyrwicka, 2015, p. 130), in the proccess of management in the Industry 4.0, aleatory phenomenon should be taken into account. This phenomenon is known in the music as consideration and sanction “the case” in the creative process. It is necessary to create and manage specific path known in probability theory as random walk, through which it will be easier to predict the emergence of random events, which in extreme cases, take the form of a wild card.

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